WHAT IS CLAIMED IS:

1. An optical wavelength division multiplexed signal monitoring apparatus comprising:

optical wavelength division demultiplexing means for carrying out optical wavelength division demultiplexing of an optical wavelength division multiplexed signal including N optical signals with a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one;

one or N opto-electric conversion means for receiving optical wavelength division demultiplexed signals demultiplexed by said optical wavelength division demultiplexing means, and for converting the optical wavelength division demultiplexed signals into electric intensity modulated signals; and

electric signal processing means for carrying out optical signal quality evaluation based on the electric intensity modulated signals output from said opto-electric conversion means,

wherein said electric signal processing means is a single system.

2. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 1, wherein said electric signal processing means has N inputs, stores N channel electric signals supplied from said N opto-

electric conversion means by N buffers for a predetermined time period, and processes the electric signals by sequentially reading them from said buffers.

3. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 1, wherein said electric signal processing means has N inputs, and processes N channel analog electric signals supplied from said N opto-electric conversion means by sequentially reading the analog electric signals by sequentially switching connections with the analog electric signals.

4. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 1, further comprising wavelength selection means disposed before said electric signal processing means for making wavelength selection by wavelength division demultiplexing to reduce a number of inputs to said electric signal processing means to one, wherein said electric signal processing means stores an electric signal supplied from said one opto-electric conversion means by a single buffer for a predetermined time period, and processes the electric signal by reading it from said buffer.

5. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 2, further comprising sampling clock generating means for generating

a sampling clock signal whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency), wherein

said electric signal processing means samples N-channel electric intensity modulated signals supplied from said N opto-electric conversion means by the sampling clock signal generated by the sampling clock generating means, obtains optical signal intensity distribution from sampled signals generated thereby, and evaluates an optical signal quality parameter for each of the N channels based on the optical signal intensity distribution.

6. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 2, further comprising:

optical sampling pulse train generating means for generating an optical sampling pulse train whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical sampling pulse train splitting means for splitting the optical sampling pulse train generated from said optical sampling pulse train generating means into N sequences;

N optical combining means for combining N-channel optical wavelength division demultiplexed singals

splitted by said optical wavelength division splitting means with N sequence optical sampling pulse trains splitted by said optical sampling pulse train splitting means;

N nonlinear optical media for inducing nonlinear interaction between the optical sampling pulse trains and the optical wavelength division demultiplexed singals combined by said optical combining means; and

N optical splitting means for splitting cross-correlation optical signals generated by the nonlinear interaction in said nonlinear optical media from the optical wavelength division multiplexed signal and from the optical sampling pulse trains, wherein

said opto-electric conversion means consists of N opto-electric conversion means for receiving the N-channel cross-correlation optical signals splitted by said optical splitting means, and for converting the N-channel cross-correlation optical signals into electric intensity modulated signals, and

said electric signal processing means obtains optical signal intensity distribution from the N-channel electric intensity modulated signals outputted by said opto-electric conversion means, and evaluates an optical signal quality parameter for each of the N channels based on the optical signal intensity distribution.

7. The optical wavelength division multiplexed signal

monitoring apparatus as claimed in claim 2, further comprising sampling clock generating means for generating a sampling clock signal whose repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency); and

N optical gating means, each of which is disposed for one of N channels, for sampling intensities of optical wavelength division demultiplexed signals with a bit rate of f_0 (bits/s), which are demultiplexed by said optical wavelength division demultiplexing means by using the sampling clock signal generated by said sampling clock generating means, wherein

said N opto-electric conversion means receive optical signals sampled by said optical gating means disposed for respective channels, and convert the optical signals into electric intensity modulated signals.

8. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 2, further comprising sampling clock generating means for generating a sampling clock signal whose repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency); and

single optical gating means for sampling N channels of the optical wavelength division multiplexed signal all at once by the sampling clock signal generated by said sampling clock generating means, before carrying out

optical wavelength division demultiplexing, wherein

said optical wavelength division demultiplexing means carries out optical wavelength division of the optical gating signal produced by said optical gating means.

9. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 2, further comprising:

optical sampling pulse train generating means for generating an optical sampling pulse train whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical combining means for combinig an optical sampling pulse train generated by said optical sampling pulse train generating means with an optical wavelength division multiplexed signal consisting of N optical signals with a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one; and

nonlinear optical medium for inducing nonlinear interaction between the optical sampling pulse train and the optical wavelength division multiplexed signal, which are combined by said optical combining means, wherein

said optical wavelength division demultiplexing means carries out wavelength division demultiplexing of

a cross-correlation optical signal, which is generated by the nonlinear interaction in said nonlinear optical medium, into N channels,

said opto-electric conversion means consists of N opto-electric conversion means for receiving the N-channel cross-correlation optical signals output from said optical wavelength division demultiplexing means, and for converting them into N-channel electric intensity modulated signals, and

said electric signal processing means obtains optical signal intensity distribution from the N-channel electric intensity modulated signals said N opto-electric conversion means output, and evaluates an optical signal quality parameter for each of the N-channels from the optical signal intensity distribution.

10. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 4, further comprising:

optical wavelength selection means for selecting and carrying out optical wavelength division demultiplexing of any one of channels of the optical wavelength division multiplexed signal consisting of N optical signals with a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one; and

selection wavelength control means for controlling a wavelength to be selected by said optical wavelength

selection means; and

sampling clock generating means for generating a sampling clock signal with a repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency), wherein

said opto-electric conversion means consists of single opto-electric conversion means for receiving one-channel optical wavelength division demultiplexed signal said optical wavelength selection means selects and demultiplexes, and converts it into an electric intensity modulated signal, and

said electric signal processing means samples the one-channel electric intensity modulated signal said opto-electric conversion means outputs by using the sampling clock signal said sampling clock generating means generates, obtains optical signal intensity distribution from a sampled signal obtained, and evaluates an optical signal quality parameter from the optical signal intensity distribution.

11. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 4, further comprising:

optical wavelength selection means for selecting and carrying out optical wavelength division demultiplexing of any one of channels of the optical wavelength division multiplexed signal consisting of N optical signals with

a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one;

selection wavelength control means for controlling a wavelength to be selected by said optical wavelength selection means;

sampling clock generating means for generating a sampling clock signal with a repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency); and

single optical gating means for sampling intensity of the one-channel optical wavelength division demultiplexed signal said optical wavelength selection means selects and demultiplexes by using the sampling clock signal said sampling clock generating means generates, wherein

said opto-electric conversion means consists of single opto-electric conversion means for receiving one-channel optical gate signal said optical gating means outputs, and converts it into an electric intensity modulated signal, and

said electric signal processing means obtains optical signal intensity distribution from the one-channel electric intensity modulated signal, and evaluates an optical signal quality parameter from the optical signal intensity distribution.

12. The optical wavelength division multiplexed signal

monitoring apparatus as claimed in claim 4, further comprising:

optical wavelength selection means for selecting and carrying out optical wavelength division demultiplexing of any one of channels of the optical wavelength division multiplexed signal consisting of N optical signals with a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one;

selection wavelength control means for controlling a wavelength to be selected by said optical wavelength selection means;

optical sampling pulse train generating means for generating an optical sampling pulse train whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical combining means for combining the optical sampling pulse train said optical sampling pulse train generating means generates with one-channel optical wavelength division demultiplexed singal said optical wavelength selection means selects and demultiplexes;

single nonlinear optical medium for inducing nonlinear interaction between the optical sampling pulse train and the optical wavelength division demultiplexed singal, which are combined by said optical combining means; and

single optical splitting means for splitting a cross-correlation optical signal generated by the nonlinear interaction in said nonlinear optical medium from the optical wavelength division demultiplexed singal and from the optical sampling pulse train, wherein

said opto-electric conversion means consists of single opto-electric conversion means for receiving the cross-correlation optical signal said optical splitting means outputs, and converts it into an electric intensity modulated signal, and

said electric signal processing means obtains optical signal intensity distribution from the electric intensity modulated signal said opto-electric conversion means produces, and evaluates the optical signal quality parameter from the optical signal intensity distribution.

13. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 4, further comprising:

sampling clock generating means for generating a sampling clock signal with a repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency);

single optical gating means for sampling intensity of an optical wavelength division multiplexed signal with a bit rate f_0 (bits/s) consisting of N optical signals which are wavelength multiplexed, where N is an integer greater

than one, by using the sampling clock signal said sampling clock generating means generates;

optical wavelength selection means for selecting and carrying out optical wavelength division demultiplexing of any one of channels of one-channel optical gating signal said optical gating means outputs; and

selection wavelength control means for controlling a wavelength to be selected by said optical wavelength selection means, wherein

said opto-electric conversion means consists of single opto-electric conversion means for receiving one-channel optical wavelength division demultiplexed signal said optical wavelength selection means selects and demultiplexes, and converts it into an electric intensity modulated signal, and

said electric signal processing means receives optical signal intensity distribution from the one-channel electric intensity modulated signal said opto-electric conversion means outputs, and evaluates an optical signal quality parameter from the optical signal intensity distribution.

14. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 4, further comprising:

optical sampling pulse train generating means for generating an optical sampling pulse train whose

repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical combining means for combining an optical sampling pulse train said optical sampling pulse train generating means generates with an optical wavelength division multiplexed signal consisting of N optical signals with the bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one;

single nonlinear optical medium for inducing nonlinear interaction between the optical sampling pulse train and the optical wavelength division multiplexed signal, which are combined by said optical combining means,

optical wavelength selection means for selecting and carrying out optical wavelength division demultiplexing any one of channels of N-channel cross-correlation optical signals generated by the nonlinear interaction in said nonlinear optical medium; and

selection wavelength control means for controlling a wavelength to be selected by said optical wavelength selection means, wherein

said opto-electric conversion means consists of single opto-electric conversion means for receiving one-channel optical wavelength division demultiplexed singal said optical wavelength selection means selects and demultiplexes, and converts it into an electric intensity

modulated signal, and

said electric signal processing means receives optical signal intensity distribution from the one-channel electric intensity modulated signal said opto-electric conversion means outputs, and evaluates an optical signal quality parameter from the optical signal intensity distribution.

15. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 3, further comprising sampling clock generating means for generating a sampling clock signal whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency), wherein

said electric signal processing means samples N-channel electric intensity modulated signals supplied from said N opto-electric conversion means by the sampling clock signal generated by the sampling clock generating means, obtains optical signal intensity distribution from sampled signals generated thereby, and evaluates an optical signal quality parameter for each of the N channels based on the optical signal intensity distribution.

16. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 3, further comprising:

optical sampling pulse train generating means for

generating an optical sampling pulse train whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical sampling pulse train splitting means for splitting the optical sampling pulse train generated from said optical sampling pulse train generating means into N sequences;

N optical combining means for combining N-channel optical wavelength division demultiplexed singals splitted by said optical wavelength division splitting means with N sequence optical sampling pulse trains splitted by said optical sampling pulse train splitting means;

N nonlinear optical media for inducing nonlinear interaction between the optical sampling pulse trains and the optical wavelength division demultiplexed singals combined by said optical combining means; and

N optical splitting means for splitting cross-correlation optical signals generated by the nonlinear interaction in said nonlinear optical media from the optical wavelength division multiplexed signal and from the optical sampling pulse trains, wherein

said opto-electric conversion means consists of N opto-electric conversion means for receiving the N-channel cross-correlation optical signals splitted by said optical

splitting means, and for converting the N-channel cross-correlation optical signals into electric intensity modulated signals, and

said electric signal processing means obtains optical signal intensity distribution from the N-channel electric intensity modulated signals outputted by said opto-electric conversion means, and evaluates an optical signal quality parameter for each of the N channels based on the optical signal intensity distribution.

17. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 3, further comprising sampling clock generating means for generating a sampling clock signal whose repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency); and

N optical gating means, each of which is disposed for one of N channels, for sampling intensities of optical wavelength division demultiplexed signals with a bit rate of f_0 (bits/s), which are demultiplexed by said optical wavelength division demultiplexing means by using the sampling clock signal generated by said sampling clock generating means, wherein

said N opto-electric conversion means receive optical signals sampled by said optical gating means disposed for respective channels, and convert the optical signals into electric intensity modulated signals.

18. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 3, further comprising sampling clock generating means for generating a sampling clock signal whose repetition frequency f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency); and

single optical gating means for sampling N channels of the optical wavelength division multiplexed signal all at once by the sampling clock signal generated by said sampling clock generating means, before carrying out optical wavelength division demultiplexing, wherein

said optical wavelength division demultiplexing means carries out optical wavelength division of the optical gating signal produced by said optical gating means.

19. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 3, further comprising:

optical sampling pulse train generating means for generating an optical sampling pulse train whose repetition frequency is f_1 (Hz) ($f_1 = (n/m)f_0 + a$, where n and m are a natural number, and a is an offset frequency) and whose pulse width is sufficiently narrower than a time slot of the optical signal with the bit rate f_0 (bits/s);

optical combining means for combinig an optical

sampling pulse train generated by said optical sampling pulse train generating means with an optical wavelength division multiplexed signal consisting of N optical signals with a bit rate f_0 (bits/s), which are wavelength multiplexed, where N is an integer greater than one; and

nonlinear optical medium for inducing nonlinear interaction between the optical sampling pulse train and the optical wavelength division multiplexed signal, which are combined by said optical combining means, wherein

said optical wavelength division demultiplexing means carries out wavelength division demultiplexing of a cross-correlation optical signal, which is generated by the nonlinear interaction in said nonlinear optical medium, into N channels,

said opto-electric conversion means consists of N opto-electric conversion means for receiving the N-channel cross-correlation optical signals output from said optical wavelength division demultiplexing means, and for converting them into N-channel electric intensity modulated signals, and

said electric signal processing means obtains optical signal intensity distribution from the N-channel electric intensity modulated signals said N opto-electric conversion means output, and evaluates an optical signal quality parameter for each of the N-channels from the optical signal intensity distribution.

20. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 6, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

21. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 7, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

22. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 8, further comprising polarization control means for controlling a

polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

23. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 9, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

24. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 11, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the

polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

25. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 12, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

26. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 13, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical

sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

27. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 14, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

28. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 16, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

29. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 17, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

30. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 18, further comprising polarization control means for controlling a polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

31. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 19, further comprising polarization control means for controlling a

polarization state of all channels of the optical wavelength division multiplexed signal in their entirety, wherein said polarization control means controls the polarization state of all channels such that it maintains a fixed polarization relationship with a polarization state of the optical sampling pulse train said optical sampling pulse train generating means outputs, or with a polarization dependence of said optical gating means.

32. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 7, further comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

33. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 9, further comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

34. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 12, further

comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

35. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 14, further comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

36. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 17, further comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

37. The optical wavelength division multiplexed signal monitoring apparatus as claimed in claim 19, further comprising optical signal wavelength dispersion control means for controlling wavelength dispersion of the optical wavelength division multiplexed signal to compensate for

wavelength dispersion of all channels of the optical wavelength division multiplexed signal in their entirety.

38. The optical wavelength division multiplexed signal monitoring apparatus as claimed in any one of claims 5-37, wherein said electric signal processing means is disposed in an optical signal receive terminal, and comprises:

a signal-to-noise ratio coefficient measuring section for measuring a signal-to-noise ratio coefficient of an optical signal transmitted on an optical signal route between an optical signal transmit terminal of a first optical node and an optical signal receive terminal of a second optical node;

an initial state storing section for storing an initial signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures in a state without any failure at a system installation; and

an optical signal quality evaluating section for comparing the initial signal-to-noise ratio coefficient stored in said initial state storing section with a signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures at every predetermined time interval during system operation, wherein

said optical wavelength division multiplexed signal monitoring apparatus carries out analog monitoring independent of an optical signal modulation method, format

and bit rate.

39. The optical wavelength division multiplexed signal monitoring apparatus as claimed in any one of claims 5-37, wherein said electric signal processing means is disposed in an optical signal receive terminal, and comprises:

a signal-to-noise ratio coefficient measuring section for measuring a signal-to-noise ratio coefficient of an optical signal transmitted on an optical signal route between an optical signal transmit terminal of a first optical node and an optical signal receive terminal of a second optical node;

an initial state storing section for storing an initial signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures in a state without any failure at a system installation; and

an optical signal quality evaluating section for comparing the initial signal-to-noise ratio coefficient stored in said initial state storing section with a signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures at every predetermined time interval during system operation, wherein

said signal-to-noise ratio coefficient measuring section comprises:

optical signal intensity distribution measurement means for measuring intensity distribution of the optical

signal by sampling intensity of the electric intensity modulated signal at a clock signal frequency f_1 (Hz) ($f_1 = (N/M)f_0 + a$, where N and M are positive numbers, and a is an offset frequency);

signal-to-noise ratio coefficient evaluation means for evaluating the signal-to-noise ratio coefficient using an amplitude histogram obtained from the optical signal intensity distribution within a mean time, and wherein

said signal-to-noise ratio coefficient evaluation means comprises:

histogram evaluation means for obtaining the amplitude histogram from the intensity distribution of the optical signal within the mean time;

distribution function evaluation means for estimating an amplitude histogram distribution function g1 corresponding to "level 1" from an amplitude histogram portion that is greater than a predetermined intensity threshold value A, and for estimating an amplitude histogram distribution function g0 corresponding to "level 0" from an amplitude histogram portion that is smaller than another predetermined intensity threshold value B; and

optical signal quality evaluation means for obtaining mean value intensities and standard deviations of the "level 1" and "level 0" from the amplitude histogram distribution functions g1 and g0, and for evaluating the signal-to-noise ratio coefficient that is obtained as a ratio of a difference between the mean value intensities

of the "level 1" and "level 0" to a sum of the standard deviations at the "level 1" and "level 0", and wherein

said optical wavelength division multiplexed signal monitoring apparatus carries out analog monitoring independent of an optical signal modulation method, format and bit rate.

40. The optical wavelength division multiplexed signal monitoring apparatus as claimed in any one of claims 5-37, wherein said electric signal processing means is disposed in an optical signal receive terminal, and comprises:

a signal-to-noise ratio coefficient measuring section for measuring a signal-to-noise ratio coefficient of an optical signal transmitted on an optical signal route between an optical signal transmit terminal of a first optical node and an optical signal receive terminal of a second optical node;

an initial state storing section for storing an initial signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures in a state without any failure at a system installation; and

an optical signal quality evaluating section for comparing the initial signal-to-noise ratio coefficient stored in said initial state storing section with a signal-to-noise ratio coefficient said signal-to-noise ratio coefficient measuring section measures at every predetermined time interval during system operation,

wherein

said signal-to-noise ratio coefficient measuring section comprises:

optical signal intensity distribution measurement means for measuring intensity distribution of the optical signal by sampling intensity of the electric intensity modulated signal at a clock signal frequency f_1 (Hz) ($f_1 = (N/M)f_0 + a$, where N and M are positive numbers, and a is an offset frequency);

signal-to-noise ratio coefficient evaluation means for evaluating the signal-to-noise ratio coefficient using an amplitude histogram obtained from the optical signal intensity distribution within a mean time, and wherein

said signal-to-noise ratio coefficient evaluation means comprises:

histogram evaluation means for obtaining the amplitude histogram from the intensity distribution of the optical signal within the mean time;

distribution function evaluation means for estimating an amplitude histogram distribution function g1 corresponding to "level 1" from an amplitude histogram portion that is greater than a predetermined intensity threshold value A, and for estimating an amplitude histogram distribution function g0 corresponding to "level 0" from an amplitude histogram portion that is smaller than another predetermined intensity threshold value B; and

optical signal quality evaluation means for

obtaining mean value intensities and standard deviations of the "level 1" and "level 0" from the amplitude histogram distribution functions g1 and g0, and for evaluating the signal-to-noise ratio coefficient that is obtained as a ratio of a difference between the mean value intensities of the "level 1" and "level 0" to a sum of the standard deviations at the "level 1" and "level 0", and wherein

said distribution function evaluation means obtains two relative maximum values from the amplitude histogram obtained from the intensity distribution of the optical signal to be measured, and makes the relative maximum value with greater amplitude intensity the intensity threshold value A, and the relative maximum value with smaller amplitude intensity the intensity threshold value B, and wherein

said optical wavelength division multiplexed signal monitoring apparatus carries out analog monitoring independent of an optical signal modulation method, format and bit rate.